TAB D

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	**CC Docket No. 01-339,**
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	**No. 96-98 &** **No. 98-147**

REPLY DECLARATION OF IRWIN GERSZBERG ON BEHALF OF AT&T CORP.

I. WITNESS BACKGROUND

1. My name is Irwin Gerszberg. I previously filed a Declaration in this proceeding on April 5, 2002 in which my background and qualifications are described.

II. SUMMARY AND INTRODUCTION

2. My Reply Declaration addresses several erroneous claims that the unbundling of NGDLC-based loops (and successor architectures) threatens deployment of broadband networks because such unbundling would greatly increase the costs of access to broadband networks. First, at least some parties persist in claiming that the NGDLC architecture introduces packet switching into the outside loop plant. Second, there are claims that non-discriminatory multi-carrier access to (*i.e.*, unbundling of) NGDLC-based loops potentially (a) introduces inefficiencies in the use of the DLC infrastructure, (b) jeopardizes feeder capacity, and/or (c) generates substantial additional costs. Finally, there is speculation that the ILEC claims with regard to unbundling the current NGDLC loop architecture are amplified in the yet-to-be-

implemented fiber-to-the-home ("FTTH") architecture.[1] None of these assertions is supportable from an engineering perspective.

III. NEITHER THE NGDLC LOOP NOR ANY OTHER TRANSMISSION FACILITY THAT EMPLOYS ATM-BASED TRANSMISSION TECHNOLOGY CONSTITUTES "PACKET SWITCHING."

3. There is nothing about the Asynchronous Transfer Mode ("ATM")-based NGDLC-loop architecture now being installed by the ILECs (nor the FTTH/BPON architecture being discussed) that supports an engineering-based conclusion that "packet switching" occurs in the ILECs' loop plant. NGDLC-enhanced loops provide exactly what "traditional" loops have always provided: transmission functionality for telecommunications signals between customers' premises and the incumbent LECs' Central Offices.

4. Digital Loop Carrier ("DLC") is a technology whose sole purpose and function is to increase the functionality and reduce the unit cost of outside loop plant. There is absolutely no engineering basis for any assertion that any DLC-based system (including NGDLC) performs any "switching" function. DLC systems perform modulation/demodulation, provide concentration functions, multiplex multiple signals onto a shared facility and may perform encoding/decoding and/or buffering functions in the process of delivering telecommunications signals from one point to another. In the ILECs' loop plant these functions are provided between the customer premises and the serving Central Office. The only significant differences among various DLC systems are those related to the efficiencies achieved in the use of the transmission medium.

[1] SBC's version of FTTH is called Broadband Passive Optical Network ("BPON"). These acronyms are treated synonymously in my declaration.

5. The introduction of DSLAM functionality in a remote terminal – whether deployed through functionality integrated on a line card or as an adjunct unit – does not change the conclusion that DLC *only* provides transmission functionality. In fact, DSLAM functionality deployed in an NGDLC architecture does not – and cannot – perform any switching functions at all. Rather, it exclusively provides core transmission functionality. Looking at this from the perspective of an engineer, given that point A (the customer premises) is only connected to point B (the Central Office) and that the signals received at Point B are exactly the same as those sent from Point A, there is no basis for any assertion that "switching" occurs in the loop plant. I recognize that the specific customer distribution pairs are dynamically attached to a shared feeder when service is required, but to label this a packet switching function when it is performed by NGDLC would be akin to labeling the concentration capability of a traditional DLC (GR303) as circuit switching, a position that even the ILECs do not argue.

6. In fact, switching is the real-time selection and interconnection of different facilities to create end-to-end transmission paths between an originating and a terminating end-user location for communications based upon customer-supplied parameters provided at the initiation of the communications. If switching is employed in an end-to-end connection, it is extremely unlikely that the same physical path would be employed in a subsequent connection between the same two points. Furthermore, when packet switching is employed – as typically occurs when a customer uses various Internet sites – it is extremely unlikely that all the packets transmitted even within the same session and to the same site will follow the same physical path. In sharp contrast, when DLC is employed in the loop plant, the connection between the customer's premises and the ILEC Central Office *always* employs the same physical path even when packets are transmitted. In packet switched networks, it is the responsibility of every

packet switch to inspect the destination address (*e.g.*, IP address) in the packet header and make a routing decision on a packet-by-packet basis. Unlike packet switching, ATM cells contain address information (*e.g.*, virtual path or channel identifier (VPI/VCI)) that directs the next ATM switch, along a prescribed route, to forward the ATM cell. *No routing decision is involved.* Thus, although the ILECs' advocacy apparently seeks to create a contrary impression, the transmission of telecommunications in a packet format cannot legitimately be confused with packet switching.

IV. NON-DISCRIMINATORY ACCESS TO ATM-BASED LOOP ARCHITECTURES DOES NOT CREATE A "PARADE OF HORRIBLES" FOR THE INCUMBENT.

7. My understanding is that current ILECs' objections to the unbundling of NGDLC loops fall generally into three areas: (a) potential premature exhaust of the physical port (*i.e.*, line card) capacity of the remote DLC frame; (b) potential inadequate capacity of the feeder connecting a particular Remote Terminal to the Central Office; and (c) additional costs associated with providing competitors with access to retail customers who are served using the NGDLC loop architecture. None of these claims withstands scrutiny.

A. The Port Exhaustion Claim

8. First, AT&T's proposal for access to unified loops in the Central Office requires only that a CLEC be able to obtain access to its customers' high frequency signals at an Optical Concentration Device ("OCD") in the ILEC's central office, *i.e.*, the same place the ILEC accesses its own customers' signals. This renders moot all concerns about NGDLC "port exhaustion" and incompatibility of line cards, because it does *not* entail the collocation of *any* CLEC line cards in the Remote Terminal. Because only the ILEC places the line cards in the

DLC, and because the connection between the customer and the service provider network is defined by a Permanent Virtual Circuit ("PVC") engineered by the ILEC rather than a hardwired connection, no inefficiency is introduced in the Remote Terminal. That is, different carriers can use the same multi-line card to serve customers subtending the Remote Terminal, rather than being required to have their own dedicated line cards. This avoids any inefficiencies in the use of the DLC infrastructure.

9. Furthermore, AT&T's unified loop approach eliminates the need for a dispatch to the Remote Terminal every time a retail customer may elect to change his/her local service provider.[2] It also promotes competition, because the number of service providers available to retail customers would only be limited by the number of carriers that have arranged to access the ILEC's OCD, and each such CLEC can offer service to all of the customers served by all of the RTs that terminate on the OCD. Thus, AT&T's unified loop unbundling proposal gives end-users greater flexibility and options in choosing their local service provider while, at the same time, having no effect at all on so-called NGDLC port exhaust.

B. The Feeder Exhaustion Claim

10. ILEC claims that unbundling might cause exhaustion of the capacity of the shared feeder are also unfounded. The ILECs' direct their initial concerns regarding feeder exhaust at

[2] If CLECs are permitted to access their customers' high frequency signals at the ILEC's OCD, then no truck roll to the ILEC's RT (or any other manual work analogous to a hot-cut) would be necessary in order to migrate an end-user's high frequency signals from one LEC to another, as long as each carrier has established access at the ILEC OCD serving that particular RT. Instead, all that would be required is that the customer's PVC be redefined to terminate from one LEC's OCD port to another LEC's port on the same OCD. This can readily be accomplished via software commands and computer table updates, so that the physical circuit and wiring remain unchanged. This efficient and economical means to migrate end-users among LECs stands in stark contrast to architectures that promote line card and/or RT/SAI collocation. Under such proposals, manual work (analogous to a hot-cut) is necessary each and every time an end-user chooses to migrate its service from one LEC to another.

issues associated with CLEC line card collocation.[3] However, as noted above, AT&T's unified loop proposal does not involve any form of line card collocation, thus rendering these ILEC concerns moot. And critically, the ILECs have made no showing that the capacity of the feeder would in fact be exhausted, under reasonable engineering considerations. Instead, they make only generalized allegations and offer absolutely no insight as to the many technical considerations upon which such a claim must be based.

11. In fact, my analysis, which I detail below, demonstrates that, under very conservative assumptions regarding typical Remote Terminal size, likely CLEC market shares and DSL penetration rates, as well as generally accepted planning assumptions relating to data and voice traffic generated by consumers, there is virtually no likelihood that the typical OC-3 feeder capacity used for RTs would be exhausted. In fact, when such considerations are taken into account, it is unlikely that more than *one-fifth* of an OC-3's capacity would be utilized even if Constant Bit Rate ("CBR") class of service is permitted for certain applications such as derived voice lines (*e.g.,* voice-over-DSL ("VoDSL")). Moreover, despite their claims to the contrary, even ILECs such as SBC recognize that when proper engineering considerations are taken into account, multiple classes of service, including CBR, can be readily provisioned over NGDLC architectures without the risk of exhausting the feeder. Lastly, in the unlikely event that a particular feeder might exhaust, its capacity could be readily increased in one of several ways I explain below. Thus, there is no basis for any legitimate claim that unbundling of unified loops would create a feeder exhaust issue. Indeed, the issue is simply a red herring.

12. Before I demonstrate that the ILECs' feeder exhaust claim is meritless, it is necessary to briefly discuss how ATM transmission protocol works in NGDLC environments

[3] *See* SBC's Comments, Attachment C *at* 4.

and why it is not only technically feasible, but necessary that CLECs be permitted to request varying service classes (*e.g.*, UBR, CBR, VBR) in order to support the applications they are likely to offer over ILEC NGDLC loops. ATM transmission protocol is simply a means (*i.e.*, a set of rules) by which varying types of communications traffic (*e.g.*, data, voice and video) can be transported from one point to another. ATM is a rather flexible transmission protocol that is capable of accommodating and prioritizing varying types of application traffic over the same transmission facility. This is in part accomplished by the assignment of a service class to each Permanent Virtual Circuit ("PVC") between the end-user and its service provider.[4] A PVC's service class determines its operating performance by defining, for example, its maximum and minimum transmission rates, whether its allocated bandwidth is reserved or shared, and whether its traffic is of high or low priority compared to other PVCs.

13. Existing ILEC NGDLC architectures such as SBC's Project Pronto architecture currently support only two distinct types of service class—Unspecified Bit Rate ("UBR") and Constant Bit Rate ("CBR").[5] UBR is typically employed for data applications such as high-speed internet connections, while CBR can be utilized for voice applications such as VoDSL or real-time video. UBR is a service class for which bandwidth is allocated to the PVC if, and only if, the requested bandwidth is available. For example, if there is network congestion, the cells

[4] In the context of ILEC NGDLC architectures, ATM establishes virtual connections referred to as PVCs between end-user premises and the ILEC's OCD in the CO. PVCs are logical in nature because they are defined in software or in the memory of networking devices. The ATM device is effectively a software controlled cross-connection that connects an input and output port based upon cell header information and an internal (but updateable) table that identifies which two ports should be connected based upon the header information. The physical circuits attached to the ports need not change.

[5] *See* generally SBC's "Broadband Service CLEC Overview, June 17, 2002, Version 9.0" available at https://clec.sbc.com/clec/hb/filelist/docs/020201-022358/Broadband%20Service%20Overview.pdf

being transported over PVCs assigned to a UBR class of service are the first to be delayed and/or dropped. Such a service class is acceptable for certain types of data applications but would be unacceptable for other applications, such as voice, which is bandwidth and delay sensitive and thus requires a uniform transmission rate in order to ensure adequate Quality of Service ("QoS"). CBR, on the other hand, reserves a given minimum amount of bandwidth for the PVC and as a result guarantees a minimum uniform rate of transmission at all times. For example, a 78 kbps CBR PVC guarantees that 78 kbps of bandwidth is always available for that PVC. The result is that applications that require a constant, uniform, predictable transmission rate (so that cell loss can be kept to a minimum in order to ensure an appropriate QoS level) can be adequately supported in an ATM environment.[6] As a result, a PVC's service class ultimately determines the types of applications that it can support.

14. Although particular types of service classes reserve fixed amounts of bandwidth, there is no legitimate basis for any claim that CLECs could exhaust a remote terminal's feeder capacity if they were allowed to obtain varying classes of service, including CBR, to support applications such as VoDSL. An OC-3 feeder facility has a total bandwidth of 155.52 Mbps, of which 149.76 Mbps are available for assignment to customers. The balance is used for network

[6] There are, however, other ATM service classes including Variable Bit Rate ("VBR") and Available Bit Rate ("ABR"). Although recognized and standardized by the ATM Forum (the industry standards body for ATM technology), VBR class of service is not currently supported by ILEC NGDLC architectures built on Alcatel's Litespan DLCs, despite the fact that the OCD equipment being utilized in such architectures, Lucent's CBX 500, does. VBR is a very efficient means by which network resources, such as feeder capacity, can be effectively shared among various carriers while at the same time ensuring that QoS is not jeopardized. VBR defines a minimum transmission rate for a given PVC but allows the allocated bandwidth to be shared when it is not in use. In this way, VBR is very similar to CBR, except that VBR allows other PVCs to use its assigned bandwidth when not in use. As a result, VBR protects a PVC's QoS but allows for the efficient utilization of bandwidth resources by permitting "overbooking," as is done with UBR.

overhead purposes.[7] Under the ILECs' NGDLC architectures, there are at least two OC-3 feeder uplinks from each RT. Transmissions in the low frequency spectrum ("LFS") of the distribution plant are multiplexed, using a Time Division Multiplexing ("TDM") approach, and transmitted over one fiber strand connecting the RT to the incumbent's CO. Transmissions in the high frequency spectrum ("HFS") of the distribution plant are multiplexed, using an ATM approach, and transmitted over a different fiber strand connecting the same RT to the CO. This latter uplink is the subject of ILEC feeder exhaust concerns and the focus on my analysis here.[8]

15. In the following analysis, I calculate the bandwidth requirements that would be needed by all LECs seeking to offer ADSL data and VoDSL services to 25% of the lines subtending a relatively large sized (672 line) RT. Using a 25% ADSL take rate, I calculate the total amount of bandwidth needed to serve 168 ADSL subscribers from such an RT (*i.e.*, a 25% ADSL take rate).[9] My analysis assumes that the line rate for ADSL service will be 1.536 Mbps

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[7] In Attachment C of its comments, SBC indicates that the "available" bandwidth on an OC-3 facility is ~135 Mbps. The 149.76 Mbps that I use in my analysis here is the recognized cell transport rate after SONET overhead is subtracted from the OC-3 line rate, and as such, it is unclear why SBC notes that the available bandwidth is only ~135 Mbps. Nonetheless, even if one used ~135 Mbps in my analysis, it would have an insignificant bearing on my calculations and conclusions here.

[8] Capacity on the TDM (voice) feeder uplink is a non-issue. As currently designed, only LFS (baseband) traffic is transported via this feeder uplink. Even for a large sized RT serving 2,016 lines, the total amount of bandwidth that would be needed to support these lines is a small fraction of the total available: ~21 Mbps or ~14% of an OC-3's total capacity, assuming a normal 6:1 concentration ratio (*i.e.*, [2016 subscribers*64 Kbps]/6). This demonstrates that transporting TDM traffic over a separate OC-3 feeder facility is extremely inefficient, because well over 80% of the OC-3's bandwidth capacity goes unused. Notably, the separate TDM feeder uplink is only necessary because of the manner by which the ILECs have implemented their NGDLC architectures by using two different transport protocols, *i.e.*, ATM and TDM.

[9] Note that many ILEC RTs serve significantly smaller volumes of lines less than 672. Under ILEC NGDLC architectures, these smaller sized RTs also use an OC-3 feeder uplink for ADSL services. Naturally, RTs with a smaller number of lines will consume less of an OC-3's bandwidth than a larger sized RT. Exhibit 1 to my declaration depicts bandwidth consumption for varying sized RTs. Furthermore, based on one of the ILEC's own cited references – *See*

downstream, and 768 Kbps upstream. My analysis further assumes a very optimistic take rate of 1.5 VoDSL lines for each ADSL subscriber (*i.e.*, 252 VoDSL lines).[10] Given that two distinct service offerings with varying bandwidth requirements are being analyzed (*i.e.*, ADSL data which utilizes UBR class of service, and VoDSL service which under the ILECs' NGDLC architecture requires the usage of CBR class of service) two separate calculations are necessary. I address the bandwidth requirements for ADSL data first, then the bandwidth requirements for VoDSL service.

16. For the bandwidth needed in order to support an ADSL data service utilizing UBR class of service, the downstream rate of 1.536 Mbps will dominate the network in terms of required bandwidth, since the downstream ADSL line rate is twice that of the upstream rate.[11] Assuming a 50:1 overbooking ratio, *i.e.*, that on average 1 in 50 subscribed lines will require the downstream capacity at any moment in time,[12] the total amount of bandwidth needed in order to

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Yankee Group's "Residential Broadband: Cable Modem Remains King" *at* 1 dated April, 2002 – the residential DSL penetration will be only 5.1% in 2002 and grow to 13.8% by 2007, based on 100M households. Thus, calculating bandwidth consumption assuming 25% DSL penetration is very conservative.

[10] Most residential customers do not generally subscribe to more than two or three POTS lines at a single location. In fact, in the Commission's report titled "Trends in Telephone Service" dated August 2001 (Table 8.4, page 8-6) additional line penetration was 29% for residential households with service. My assumption of 50% additional line penetration is conservative, particularly given the downward pressures that cellular subscriptions appear to be having with respect to second lines.

[11] Downstream traffic tends to be heavier than upstream traffic. For example, the downstream "pipe" is usually filled with file downloads, audio, video, e-mail with MIME attachments, etc., while the upstream "pipe" typically consists of short commands followed by longer downloads. In fact, acknowledgements to downloaded traffic account for most of the upstream traffic and utilize minimum amounts of bandwidth.

[12] Overbooking refers to the proportion of subscribed customers that are assumed to require the identified capacity simultaneously. In this instance 50:1 overbooking means 2% of the total base (in the RT) requires the capacity while 20:1 means 5% of the total base does. This is because even though many customers may be "on line" at the same time, they spend most of their time

support 168 ADSL subscribers would be 5.161 Mbps or ~3% of the available capacity of an OC-3 feeder facility ([(1.536 Mbps)*(168 subscribers)] / 50). Even if one assumed a more aggressive overbooking ratio, such as 20:1, then the total amount of bandwidth needed to support 168 ADSL subscribers would be 12.902 Mbps or only ~9% of the available capacity of an OC-3 feeder facility.

17. In determining the bandwidth requirements for a VoDSL service offering utilizing CBR class of service, I have, as noted above, assumed an optimistic take rate of 1.5 VoDSL lines per ADSL subscriber (*i.e.*, 252 VoDSL lines). VoDSL is a narrowband voice service that requires ~78 Kbps of bandwidth per channel. However, given the needed performance parameters surrounding such an application, an ATM class of service that guarantees QoS and a Sustained Cell Rate ("SCR") is necessary.[13] Although Variable-Bit-Rate ("VBR") class of service under the ATM protocol is a much more efficient class of service to utilize (and would be suitable for VoDSL applications), ILEC NGDLC architectures such as SBC's Project Pronto do not typically support VBR class of service. Instead, they support the UBR and CBR classes of service. Under the ILECs' design, CBR class of service (which reserves and does not share bandwidth) would be required for the VoDSL application that CLECs such as AT&T would offer. However, given the low-bandwidth needs of the VoDSL application, allowing such a service to utilize CBR class of service would not create a feeder exhaust issue. In fact, the needed bandwidth for 252 VoDSL lines, under a service class such as CBR, which does not permit overbooking, is relatively straightforward to calculate: 252 VoDSL Lines * 78 Kbps = 19.656 Mbps or only ~13% of the total available capacity on an OC-3 feeder facility.

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reviewing material that has been downloaded, and do not require the use of the downstream capacity during those periods.

[13] Sustained Cell Rate is the minimum requirement for continuous transmission capacity

18. Taken together, for an RT serving 672 lines, the total bandwidth requirements for *both* an ADSL and VoDSL offering provided over 25% of the lines would be 24.817 Mbps or only ~17% of the total available capacity on an OC-3 feeder facility. And even if a 20:1 overbooking ratio were used for the ADSL offering, only a total of 32.558 Mbps or ~22% of the total OC-3 feeder capacity would be required. Stated another way, *approximately 80% of an OC-3 feeder's bandwidth would remain unused* even if high-quality ADSL service were provided in conjunction with CBR-based VoDSL service to 25% of end-users served by the RT – several times more than the current or near-term projected subscription rates for DSL services. This hardly presents any risk of feeder exhaust. Even when the same assumptions are applied to the largest RT size, there is no exhaust of capacity indicated. Indeed, given the underutilization of the feeder facility it is clear that even higher-bandwidth CBR-based applications could be supported without the risk of exhausting the feeder. Furthermore, it is important to note that my analysis here is conservative, because it (a) assumes a larger than typical number of lines served per RT, (b) assumes a relatively high-ADSL penetration rate, (c) assumes a worst case ADSL line rate of 1.536 Mbps downstream, and (d) assumes a reasonably optimistic take rate for VoDSL lines per ADSL subscriber. Yet, even with such conservative assumptions, it is clear that no feeder exhaust issue is present now or in the foreseeable future.[14]

19. Indeed, despite their claims to the contrary here, the ILECs themselves recognize that CBR levels of service are reasonable. In particular, SBC provides access to its NGDLC loops as a wholesale service, which it refers to as "Broadband Wholesale Service." As part of

[14] Indeed, the feeder facility could even be more efficiently used if VBR class of service were supported to provision services such as VoDSL that require a sustained cell rate. If VBR were available and assumed in my analysis for VoDSL services, then only 9.256 Mbps or ~6% of an OC-3 feeder's capacity would be needed, almost 2/3 less than is required when CBR is used for VoDSL. Exhibit 1 to my declaration also shows OC-3 utilization for varying sized RTs when VBR class of service is assumed for VoDSL.

this so-called wholesale service, SBC has offered CLECs access to CBR PVCs, not just UBR PVCs. In fact, according to the technical documentation associated with SBC's Broadband Wholesale Service, approximately 20% of an OC-3's (data) feeder capacity will be reserved for services requiring CBR class of service.[15]

20. Further, Alcatel, the ILECs' vendor of choice for their NGDLC equipment, expressly states in its technical specifications for its Litespan 2000 product line that "[m]ultiple traffic queues and cell schedulers in Litespan ADSL allow CBR-based (*i.e.*, real time video or voice over DSL) and UBR-based (*i.e.*, high-speed Internet access) services to coexist on the same ADSL twisted pair cable drop."[16] Clearly, such equipment would not have been engineered to support varying classes of services, including CBR, if the OC-3 feeder uplink (which is one of the standard network interfaces available with the Litespan 2000 product) was incapable of supporting it. Moreover, SBC would not be making CBR class of service available to CLECs if the use of CBRs raised legitimate issues of feeder exhaust. These facts clearly demonstrate that feeder facilities can be engineered in order to support varying classes of service, including CBR, in a manner that avoids feeder exhaust issues.

21. But even if existing OC-3 feeder facilities were at risk of exhaust -- which they are not -- such a situation could be readily addressed in one of several ways. One would be to change the OC-3 port card of the DLC (*i.e.*, the interface between the DLC and the fiber feeder) and the corresponding port at the OCD to support a higher-speed transmission over the same fiber facility (*e.g.*, OC-12). Such an upgrade would yield many more times the capacity of the

[15] *See* SBC's "Broadband Service Phase 1, 2, 3 TP76842MP, Issue 4" *at* 20 dated June 18, 2002 available at https://clec.sbc.com/clec/hb/filelist/docs/020201-022434/Broadband%20Technical%20Publication.doc

[16] *See* Alcatel's "Litespan ADSL—Integrated POTS and ADSL" documentation *at* 2 available at http://www7.alcatel.com/datasheets/lsp_adsl.pdf

existing feeder facility—approximately four times more raw capacity in the case of an OC-3 (155 Mbps) to OC-12 (622 Mbps) upgrade.[17] Alternatively, additional feeder capacity could also be realized by adding additional OC-3 uplinks from the RT to the CO if there is dark fiber available between those points. This could be accomplished by increasing the number of network interfaces on the DLC (*i.e.*, OC-3 uplink ports in the RT) and connecting them to the CO using the dark fiber. Such spare fiber is routinely deployed on such fiber routes for exactly this purpose — *i.e.*, to be used if and when existing fiber facilities become exhausted. Neither of these approaches would typically require the deployment of additional fiber between the RT and CO.

C. <u>The Increased Cost Claims</u>

22. ILEC claims regarding the costs associated with providing multi-carrier access are wildly overblown. Multi-carrier access to customers served by an ATM-based transmission path requires only (1) an appropriately sized port on the network side of the OCD (where the carrier will access its customers' signals) and (2) a means to define the PVC between an end user and the carrier's access point at the OCD. This does not require Remote Terminal collocation, nor does it require an OCD dedicated to an individual CLEC. Instead, it only requires CLECs to obtain a port on the OCD and administrative procedures to define the PVC -- something done every day by ATM network administrators, and indeed a capability that already is in place, as evidenced by ILEC NGDLC "service offers" such as SBC's "Broadband Wholesale Service" offering.

23. The OCD equipment (*e.g.*, Lucent CBX 500 ATM modules) being deployed in ILEC NGDLC architectures such as SBC's Project Pronto architecture and Verizon's PARTS

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[17] In fact, Alcatel's Litespan 2012 NGDLC supports OC-12 feeder uplinks.

architecture are designed to be very scalable and thus are very supportive of multi-carrier access. In some cases the ILEC's OCD may already have extra, unused ports (*e.g.*, DS-3, OC-3) that could be assigned to CLECs seeking to access the loops sub-tending that OCD. Where no extra, unused ports are available, the scalable, modular design of OCD equipment such as Lucent's CBX 500 allows for the flexible, cost efficient addition of ports. An ILEC would simply need to add a DS3 or OC-3 Input/Output Module ("IOM") in order to increase the number of needed ports on the OCD. IOM's are analogous to the line cards in NGDLC equipment. For example, a single DS-3 IOM for the CBX 500 supports 8 DS-3 ports—an OC-3 IOM supports 4 OC-3 ports.[18] If and when extra ports are needed, the ILEC simply need add the appropriate IOM (*e.g.*, DS-3, OC-3) to its OCD equipment. The CBX 500, for example, can accommodate a maximum total of 14 DS-3 IOMs for a total of 112 DS-3 ports or a maximum total of 14 OC-3 IOMs for a total of 56 OC-3 ports or some combination thereof.[19]

24. Moreover, SBC's estimates of additional costs to support competition appear highly inflated. Given the total number of local switches in the SBC operating territory and the typical, non-discounted price for an OC-3 port (and the ILECs do not pay non-discounted prices) on OCD equipment, the entire equipment investment for equipping all SBC end-offices to accommodate four additional carriers is less than $200 million. This is an amount far below the hundreds of millions (and even billions) of dollars SBC asserts it would take to implement CLEC access to its Project Pronto architecture, which does not even impact all end-offices. In all events, such an upper bound figure represents but ~3% of the total Project Pronto costs reported

[18] The CBX 500 also supports various other types of IOMs, including those that contain DS1 and OC-12 ports.

[19] The CBX 500 also supports DS1 and OC-12 IOMs. The DS-1 IOM supports 8 DS1 ports. The OC-12 IOM supports 1 OC-12 port.

by SBC – expense that would be included in TELRIC costs that CLECs would have to pay – and is substantially less than the costs necessary to support remote terminal collocation.

25. Furthermore, there is no reason to believe that an efficiently designed approach to managing the establishment of, or change to, a PVC should cost anything materially different from the direct economic cost of changing a customer's Primary Interexchange Carrier ("PIC") on a circuit switch or the cost of implementing a UNE-P migration that requires no physical change.[20] Both processes allow end-users to change their service provider through a fully mechanized process rather than through manual re-wiring. Similarly, with an ATM-based loop architecture, a customer's PVC connection to the service provider can be modified through an fully mechanized process. More specifically, the customer's PVC would be repointed to terminate on the OCD port of the new carrier. As mentioned earlier, this means the internal table of the ATM device would be modified so that the cells associated with the customer (i.e., the particular PVC (VPI/VCI)) are cross-connected to a new port. This process can be accomplished through electronic bonding between the ILEC and CLEC Operations Support Systems ("OSS").

V. CLAIMS OF SUBSTANTIALLY HIGHER COST ASSOCIATED WITH UNBUNDLING FTTH/BPON ARCHITECTURES ARE UNSUPPORTABLE

26. Finally, even if speculation about future prospects for FTTH/BPON architecture were relevant to the discussion of current NGDLC access, there is no evidence that multi-carrier access to (*i.e.,* unbundling of) BPON-based loops involves technical accommodations that are significantly more difficult or costly than unbundling NGDLC-based loops. In both cases, the

[20] For example, I understand that the fully allocated cost of a fully mechanized PIC change by BellSouth averages $ 1.30. On the other hand, the UNE-P migration charge, without any physical changes, is only $ 0.10 in the state of Florida.

CLEC would receive access to its customers' "packets" by connecting to a port on the network side of the OCD (or its functional equivalent) located in the ILEC Central Office.[21] Assuming that ATM-based transmissions are employed over both the NGDLC or BPON architecture – a reasonable assumption given the current knowledge of BPON architectures – once the facility from the relevant Remote Terminal is terminated on an OCD port of appropriate capacity, the means of carrier access (*i.e.*, creating virtual circuits ("VCs") and managing the shared feeder) have no apparent differences. Said another way, carrier access is defined solely by the VC and cell header.

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[21] Under SBC's BPON architecture, this equipment is referred to as an Optical Line Terminal ("OLT"). An OLT, under a FTTH architecture, transmits and receives optical signals from several sub-tending splitters and is generally based on ATM protocol.

VERIFICATION PAGE

I hereby declare under penalty of perjury that the foregoing is true and accurate to the best of my knowledge and belief.

Irwin Gerszberg

July 10, 2002

Exhibit 1

Analysis Parameters (Version A)

OC-3 Available Bandwidth (Mbps)	149.76	
ADSL Penetration	25%	
ADSL Line Rate - Downstream (Mbps)	1.536	
ADSL Overbooking Ratio	**50:1**	**50**
ADSL Class of Service	UBR	
VoDSL Lines per ADSL Subscriber	1.5	
VoDSL Bit Rate - (Mbps)	0.078	
Blocking Probability	<0.5%	
VoDSL Class of Service	CBR / VBR	

When Using CBR for VoDSL...

RT Size	# ADSL Subscribers	# VoDSL Lines	VoDSL Concentration Ratio	ADSL BW (Mbps)	VoDSL BW (CBR) (Mbps)	Total BW (Mbps)	% Used	% Remaining
24	6	9	1.00	0.184	0.702	0.886	1%	99%
96	24	36	1.00	0.737	2.808	3.545	2%	98%
336	84	126	1.00	2.580	9.828	12.408	8%	92%
672	**168**	**252**	**1.00**	**5.161**	**19.656**	**24.817**	**17%**	**83%**
1344	336	504	1.00	10.322	39.312	49.634	33%	67%
2016	504	756	1.00	15.483	58.968	74.451	50%	50%

When Using VBR for VoDSL...

RT Size	# ADSL Subscribers	# VoDSL Lines	VoDSL Concentration Ratio	ADSL BW (Mbps)	VoDSL BW (VBR) (Mbps)	Total BW (Mbps)	% Used	% Remaining
24	6	9	1.80	0.184	0.390	0.574	0%	100%
96	24	36	3.28	0.737	0.856	1.593	1%	99%
336	84	126	4.50	2.580	2.184	4.764	3%	97%
672	**168**	**252**	**4.80**	**5.161**	**4.095**	**9.256**	**6%**	**94%**
1344	336	504	5.90	10.322	6.663	16.985	11%	89%
2016	504	756	6.00	15.483	9.828	25.311	17%	83%

Analysis Parameters (Version B)

OC-3 Available Bandwidth (Mbps)	149.76	
ADSL Penetration	25%	
ADSL Line Rate - Downstream (Mbps)	1.536	
ADSL Overbooking Ratio	**20:1**	**20**
ADSL Class of Service	UBR	
VoDSL Lines per ADSL Subscriber	1.5	
VoDSL Bit Rate - (Mbps)	0.078	
Blocking Probability	<0.5%	
VoDSL Class of Service	CBR / VBR	

When Using CBR for VoDSL...

RT Size	# ADSL Subscribers	# VoDSL Lines	VoDSL Concentration Ratio	ADSL BW (Mbps)	VoDSL BW (CBR) (Mbps)	Total BW (Mbps)	% Used	% Remaining
24	6	9	1.00	0.461	0.702	1.163	1%	99%
96	24	36	1.00	1.843	2.808	4.651	3%	97%
336	84	126	1.00	6.451	9.828	16.279	11%	89%
672	**168**	**252**	**1.00**	**12.902**	**19.656**	**32.558**	**22%**	**78%**
1344	336	504	1.00	25.805	39.312	65.117	43%	57%
2016	504	756	1.00	38.707	58.968	97.675	65%	35%

When Using VBR for VoDSL...

RT Size	# ADSL Subscribers	# VoDSL Lines	VoDSL Concentration Ratio	ADSL BW (Mbps)	VoDSL BW (VBR) (Mbps)	Total BW (Mbps)	% Used	% Remaining
24	6	9	1.80	0.461	0.390	0.851	1%	99%
96	24	36	3.28	1.843	0.856	2.699	2%	98%
336	84	126	4.50	6.451	2.184	8.635	6%	94%
672	**168**	**252**	**4.80**	**12.902**	**4.095**	**16.997**	**11%**	**89%**
1344	336	504	5.90	25.805	6.663	32.468	22%	78%
2016	504	756	6.00	38.707	9.828	48.535	32%	68%

TAB E

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	CC Docket No. 01-338
	)	
Implementation of the Local Competition Provisions of the Telecommunications Act of 1996	)	CC Docket No. 96-98
	)	
Deployment of Wireline Services Offering Advanced Telecommunications Capability	)	CC Docket No. 98-147

REPLY DECLARATION OF MARK J. LANCASTER
AND DALE C. MORGENSTERN
ON BEHALF OF AT&T CORP.

I. QUALIFICATIONS

1. **Mark J. Lancaster.** My name is Mark J. Lancaster. My business address is 1100 Walnut Street, Kansas City, Missouri 64106. I am employed by AT&T as a Technical Support Manager in the Local Services Division. My primary responsibilities are to provide strategic network planning expertise to internal AT&T clients, and to work with state regulatory commissions and industry representatives to encourage competitive opportunities for AT&T in the provision of telecommunications service.

2. I received a Bachelor of Science degree in Psychology from Northwest Missouri State University in 1976 and a Master of Arts degree in Education from the

University of Missouri-Kansas City in 1978. I am currently working towards a Masters of Business Administration degree from Keller Graduate School of Management in Kansas City, Missouri.

3. My career with AT&T began in 1979, when I was hired by Southwestern Bell Telephone Company as a Service Consultant in the Marketing organization. I worked extensively with plant, engineering, accounting, and the business office in support of sales to customers in the utilities and data processing industry. In 1982, I accepted a position in AT&T's Long Lines Engineering organization. I held various positions in AT&T, including Engineering Systems Design, Switch Planning, and Material Management. In 1990, I accepted a position in State Government Affairs developing Network and Access costs in support of AT&T's intrastate service filings. My duties also included analysis, intervention, and negotiations related to local exchange company service filings. In 1993, I joined the Access Management organization and worked in all phases of access rate design and intervention, primarily in Arkansas, Kansas, and Missouri. I accepted my current position in 1996.

4. **Dale C. Morgenstern**. My name is Dale C. Morgenstern. My business address is 900 Route 202, Bedminster, New Jersey 07921. I am employed by AT&T as District Manager – Numbering & 911 Planning. Since January 1999, I have been responsible for numbering and 911 planning and implementation for various AT&T local network services and for AT&T's internal test network. My 911 responsibilities focus on ensuring that AT&T's internal network is in compliance with state and local regulatory requirements.

5. I received a Bachelor of Arts degree in Mathematics from Syracuse University in 1974 and a Masters degree in Mathematics from the same school in 1975.

6. I began my career with AT&T in 1976 in the company's Network Service Distribution organization. From 1976 to 1981, I was employed in the Circuit Administration and Transmission Engineering departments of that organization and was involved in designing and implementing performance measurement plans for transmission and trunk administration. In 1981, I began a rotational assignment in AT&T's New York Telephone unit. From 1984 to 1988, I was employed in the Network Service Field Support and Technical Regulatory Planning departments of AT&T's Network Operations organization, where my responsibilities included the development of dialing and routing plans for "National Security-Emergency Preparedness" government networks. In 1988, I moved to AT&T's Consumer Communications Services unit, where I held a succession of jobs in the New Business Development, Consumer Information Management, and Consumer Video Services departments. From 1994 until I accepted my current job in January 1999, I was employed in AT&T's Customer Connectivity organization, where my responsibilities included operations planning and implementation for AT&T Customer Network Service Centers as well as number administration and local number portability implementation.

II. <u>INTRODUCTION AND SUMMARY</u>

7. The purpose of this declaration is to rebut the contention in the ILECs' "UNE Fact Report 2002" ("ILEC Report") that the listings of telephone numbers in Enhanced 911 ("E911") databases are a reliable source from which to determine

the number of business lines currently served by CLECs using their own facilities. Although the volume of numbers in use by any one carrier's customers may suggest competitive entry, its relationship to the service provided and the facilities used to provide such service is, at best, tenuous.

III. ANALYSIS

8. The sole purpose of including telephone numbers in the E911 database is to ensure proper emergency response for 911 users. The methods and procedures used by each carrier and the industry guidelines for database population both are designed strictly for the limited (albeit important) purpose of facilitating accurate identification of a caller. Therefore, to the extent these databases are "maintained with scrupulous care," it is to promote effective emergency response, not to catalogue correctly the number of telephone lines provided by any one carrier or the facilities they use in providing such service.

9. E911 databases serve as the foundation for the provision of emergency services. When a customer dials 911, the call is directly routed to the Public Safety Answering Point ("PSAP") charged with responding to emergency calls within the area where the customer is located. When the PSAP receives a call, the call is accompanied by Automatic Location Identification ("ALI") that provides the caller's telephone number, the address or location of the telephone the caller is using, and supplemental emergency services information. This information is maintained by the ALI Database Management Systems Provider, and it is accessed by PSAPs in order to enable them to link the caller's telephone number with the information maintained in the database. Although the ILECs originally

served as ALI Database providers and therefore had control of the databases, more recently this function has been provided by third-party vendors, who allow individual carriers to make their own judgments on database population.

10. The National Emergency Number Association ("NENA"), an organization that includes industry experts from both the public and private sectors, defines standard practices to ensure the compatibility of 911 technologies and increase the effectiveness of 911 systems. NENA's standards reflect industry consensus and provide the basis for agreements among 911 jurisdictions, local exchange carriers, and the ALI Database Management System Provider. However, because NENA has no authority to enforce compliance, the standards it promulgates are merely recommendations. In fact, there are many factors that suggest that the number of lines identified by a direct count of telephone numbers in the ALI Database is likely to be significantly different from the number of voice grade equivalent lines provided by each local exchange carrier.

11. When a carrier provisions local service, the carrier is responsible for electronically populating the ALI Database with the Master Street Address Guide ("MSAG") valid address of the customer. Although NENA guidelines set forth the criteria for telephone numbers to be included in the ALI Database, each carrier populates the database using its own protocol for record creation, maintenance, and deletion.

12. For example, NENA guidelines recommend that carriers not include telephone numbers for classes of service that do not generate dial tone, such as direct inward

dial ("DID") numbers. However, when a customer with a large volume of numbers migrates to AT&T's services from another carrier, AT&T has no easy way to determine the details of the customer's PBX configuration. Because it is not clear which numbers should be included, in order to implement the purposes of the E911 system (to assure prompt and accurate access to emergency assistance), AT&T takes the conservative approach of including *all* ported numbers, including DID numbers. As a result, AT&T's listings in the ALI Database include a significantly larger number of telephone numbers than the actual facilities needed to provide emergency service.[1]

13. Area code splits can also cause CLEC telephone numbers to be overstated during the permissive dialing period. It is not uncommon for carriers to provide duplicate listings reflecting both the old and new area codes. This assures the continuation of emergency access for customers even if there are routing errors that occur during the overlay transition.

14. Telephone numbers can also remain in the ALI Database even though the number is no longer active. NENA guidelines provide mechanisms for the removal of inactive telephone numbers, but inactive numbers can remain in the ALI database without interfering with the accurate operation of the service. Therefore, it is not uncommon for a carrier not to delete a particular number concurrently with its

[1] AT&T network engineering standards allow for up to 500 DID numbers for each DS-1 facility purchased by a customer. AT&T does not include DID numbers when a customer uses telephone numbers from a block of numbers assigned to AT&T that was originally provisioned by AT&T, because in those cases, AT&T has specific information regarding the status of each number.

termination, instead completing the function on a regular interval of up to several months, or even yearly. Further, because database reconciliations and audits are not required, it is possible for deactivated numbers to remain undetected for extended periods.

15. Another factor that undermines the accuracy of an ALI database count for the purposes the ILECs identify is that a number of CLECs have withdrawn from the market and abandoned telephone numbers. Not surprisingly, these carriers have few resources, and even less motivation, to do the work necessary to "clean up" the ALI database, and consequently blocks of inactive numbers remain in the database.

16. As a result of these factors, and because of the critical link between carriers' ALI database population and the delivery of emergency services to customers, it is likely that the E911 database will overstate the number of lines served by CLECs. Therefore, the database is an inaccurate and unreliable measure of competition in the local market.

VERIFICATION

I, Mark J. Lancaster, declare under penalty of perjury that the foregoing is true and correct. Executed on July 16, 2002.

Mark J. Lancaster

VERIFICATION

I, Dale C. Morgenstern, declare under penalty of perjury that the foregoing is true and correct. Executed on July 16, 2002.

Dale C. Morgenstern

Dale C. Morgenstern